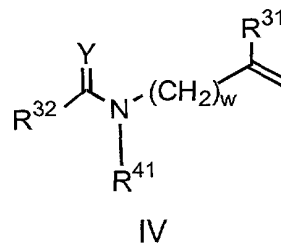
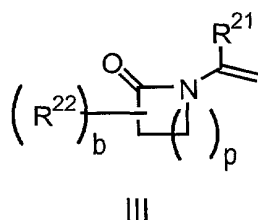
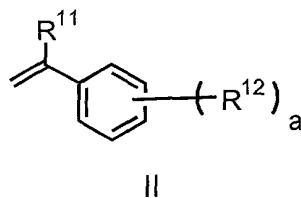
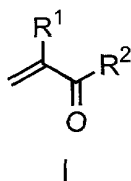


What is claimed is:

1. An antimicrobial lens comprising silver and a polymer comprising a monomer of Formula I, II, III or IV



wherein

10  $R^1$  is hydrogen or  $C_{1-6}$ alkyl;

$R^2$  is  $-OR^3$ ,  $-NH-R^3$ ,  $-S-(CH_2)_d-R^3$ , or  $-(CH_2)_d-R^3$ , wherein

$d$  is 0-8;

$R^3$  is substituted  $C_{1-6}$ alkyl

15 where the alkyl substituents are selected from one or more members of the group consisting of carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol,  $C_{1-6}$ alkyldisulfide,  $C_{1-6}$ alkylsulfide, phenyldisulfide, urea,  $C_{1-6}$ alkylurea, phenylurea, thiourea,  $C_{1-6}$ alkylthiourea, phenylthiourea, substituted  $C_{1-6}$ alkyldisulfide, substituted phenyldisulfide, substituted  $C_{1-6}$ alkylurea, substituted phenylurea, substituted  $C_{1-6}$ alkylthiourea, and substituted phenylthiourea

20 wherein the  $C_{1-6}$ alkyldisulfide, phenyldisulfide,

25  $C_{1-6}$ alkylurea,  $C_{1-6}$ alkylthiourea, phenylurea, and

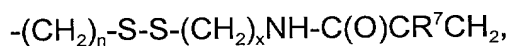
phenylthiourea substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;



wherein R<sup>4</sup>, R<sup>5</sup>, and R<sup>6</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl,

q is 1-6, and

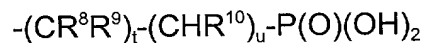
10 m is 0-6;



wherein R<sup>7</sup> is hydrogen or C<sub>1-6</sub>alkyl,

n is 1-6, and

x is 1-6;



wherein R<sup>8</sup>, R<sup>9</sup>, and R<sup>10</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl,

t is 1-6, and

20 u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

25 pyrazinyl;

benzimidazolyl;

benzothiazolyl;

benzotriazolyl;

naphthaloyl;

30 quinolinyl;

indolyl;

thiadiazolyl;  
 triazolyl;  
 4-methylpiperidin-1-yl;  
 4-methylpiperazin-1-yl;  
 substituted phenyl;  
 substituted benzyl;  
 substituted pyridinyl;  
 substituted pyrimidinyl;  
 substituted pyrazinyl;  
 substituted benzimidazolyl;  
 substituted benzothiazolyl;  
 substituted benzotriazolyl;  
 substituted naphthaloyl;  
 substituted quinolinyl;  
 substituted indolyl;  
 substituted thiadiazolyl;  
 substituted triazolyl;  
 substituted 4-methylpiperidin-1-yl; or  
 substituted 4-methylpiperazin-1-yl,  
 wherein the substituents are selected from one or more  
 members of the group consisting of C<sub>1-6</sub>alkyl,  
 haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,  
 hydroxyl, carboxylic acid, amine, amidine,  
 N-(2-aminopyrimidine)sulfonyl,  
 N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,  
 N-(2-aminopyrimidine)carbonyl,  
 N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,  
 N-(2-aminopyrimidine)phosphonyl,  
 N-(2-aminopyridine)phosphonyl,  
 N-(aminopyrazine)phosphonyl,  
 N-(aminobenzimidazolyl)sulfonyl,

N-(aminobenzothiazolyl)sulfonyl,  
 N-(aminobenzotriazolyl)sulfonyl,  
 N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
 N-(aminotriazolyl)sulfonyl,  
 N-(amino-4-methylpiperidiny)lsulfonyl,  
 N-(amino-4-methylpiperazinyl)sulfonyl,  
 N-(aminobenzimidazolyl)carbonyl,  
 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidiny)lcarbonyl,  
 N-(amino-4-methylpiperazinyl)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidiny)l phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,

hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

a is 1-5;

R<sup>11</sup> is hydrogen or C<sub>1-6</sub>alkyl;

R<sup>12</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid, acetamide, thioC<sub>1-6</sub>alkylcarbonyl, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, -OR<sup>13</sup>, -NH-R<sup>13</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -C(O)NH--(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -C(O)-(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted phenylthiourea or substituted C<sub>1-6</sub>alkylthiourea wherein the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

where

d is 0-8;

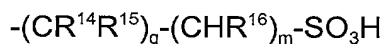
R<sup>13</sup> is thioC<sub>1-6</sub>alkylcarbonyl;

substituted C<sub>1-6</sub>alkyl

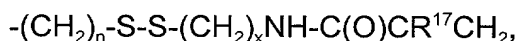
where the alkyl substituents are selected from one or more members of the group consisting of hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted C<sub>1-6</sub>alkylthiourea and substituted phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and phenylthiourea substituents are selected from the

group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;



where R<sup>14</sup>, R<sup>15</sup>, and R<sup>16</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl, q is 1-6, and m is 0-6;



where R<sup>17</sup> is hydrogen or C<sub>1-6</sub>alkyl, n is 1-6, and x is 1-6;



where R<sup>18</sup>, R<sup>19</sup>, and R<sup>20</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl, t is 1-6, and u is 0-6;

phenyl;  
benzyl;  
pyridinyl;  
pyrimidinyl;  
pyrazinyl;  
benzimidazolyl;  
benzothiazolyl;  
benzotriazolyl;  
naphthaloyl;  
quinolinyl;  
indolyl;  
thiadiazolyl;

triazolyl;  
4-methylpiperidin-1-yl;  
4-methylpiperazin-1-yl;  
substituted phenyl;  
substituted benzyl;  
substituted pyridinyl;  
substituted pyrimidinyl;  
substituted pyrazinyl;  
substituted benzimidazolyl;  
substituted benzothiazolyl;  
substituted benzotriazolyl;  
substituted naphthaloyl;  
substituted quinolinyl;  
substituted indolyl;  
substituted thiadiazolyl;  
substituted triazolyl;  
substituted 4-methylpiperidin-1-yl; or  
substituted 4-methylpiperazin-1-yl

wherein the substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid, hydroxyl, carboxylic acid, amine, amidine, N-(2-aminopyrimidine)sulfonyl, N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl, N-(2-aminopyrimidine)carbonyl, N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl, N-(2-aminopyrimidine)phosphonyl, N-(2-aminopyridine)phosphonyl, N-(aminopyrazine)phosphonyl, N-(aminobenzimidazolyl)sulfonyl, N-(aminobenzothiazolyl)sulfonyl,

N-(aminobenzotriazolyl)sulfonyl,  
 N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
 N-(aminotriazolyl)sulfonyl,  
 N-(amino-4-methylpiperidiny)lsulfonyl,  
 N-(amino-4-methylpiperazinyl)sulfonyl,  
 N-(aminobenzimidazolyl)carbonyl,  
 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidiny)lcarbonyl,  
 N-(amino-4-methylpiperazinyl)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidiny)l phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
 hydroxyl, carboxylic acid, sulfonic acid, phosphonic



acid, amine, amidine, acetamide, and nitrile;

b is 1-5;

p is 1-5;

R<sup>21</sup> is hydrogen;

R<sup>22</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid, thioC<sub>1-6</sub>alkylcarbonyl, thioC<sub>1-6</sub>alkylaminocarbonyl, C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, -C(O)NH(CH<sub>2</sub>)<sub>1-6</sub>-SO<sub>3</sub>H, -C(O)NH(CH<sub>2</sub>)<sub>1-6</sub>-P(O)(OH)<sub>2</sub>, -OR<sup>23</sup>, -NH-R<sup>23</sup>, -C(O)NH-(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted, C<sub>1-6</sub>alkylthiourea substituted phenylurea or substituted phenylthiourea wherein the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile,

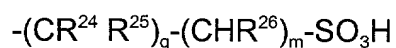
where

d is 0-8;

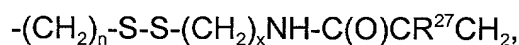
R<sup>23</sup> is thioC<sub>1-6</sub>alkylcarbonyl,  
C<sub>1-6</sub>alkyl,  
substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl, halo C<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted C<sub>1-6</sub>alkylthiourea, and substituted phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
phenylthiourea substituents are selected from the  
group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
hydroxyl, carboxylic acid, sulfonic acid, phosphonic  
acid, amine, amidine, acetamide, and nitrile;



where R<sup>24</sup>, R<sup>25</sup>, and R<sup>26</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
q is 1-6, and  
m is 0-6



where R<sup>27</sup> is hydrogen or C<sub>1-6</sub>alkyl,  
n is 1-6, and  
x is 1-6;



where R<sup>28</sup>, R<sup>29</sup>, and R<sup>30</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
t is 1-6, and  
u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

pyrazinyl;

benzimidazolyl;

benzothiazolyl;

benzotriazolyl;

naphthaloyl;

quinolinyl;

indolyl;

thiadiazolyl;

triazolyl;

4-methylpiperidin-1-yl;

4-methylpiperazin-1-yl;

substituted phenyl;

substituted benzyl;

substituted pyridinyl;

substituted pyrimidinyl;

substituted pyrazinyl;

substituted benzimidazolyl;

substituted benzothiazolyl;

substituted benzotriazolyl;

substituted naphthaloyl;

substituted quinolinyl;

substituted indolyl;

substituted thiadiazolyl;

substituted triazolyl;

substituted 4-methylpiperidin-1-yl; or

substituted 4-methylpiperazin-1-yl,

wherein the substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl,

haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,

hydroxyl, carboxylic acid, amine, amidine,

N-(2-aminopyrimidine)sulfonyl,

N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,

N-(2-aminopyrimidine)carbonyl,

N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,

N-(2-aminopyrimidine)phosphonyl,

N-(2-aminopyridine)phosphonyl,

N-(aminopyrazine)phosphonyl,  
 N-(aminobenzimidazolyl)sulfonyl,  
 N-(aminobenzothiazolyl)sulfonyl,  
 N-(aminobenzotriazolyl)sulfonyl,  
 5 N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
 N-(aminotriazolyl)sulfonyl,  
 N-(amino-4-methylpiperidiny)lsulfonyl,  
 N-(amino-4-methylpiperazinyl)sulfonyl,  
 N-(aminobenzimidazolyl)carbonyl,  
 10 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidiny)lcarbonyl,  
 15 N-(amino-4-methylpiperazinyl)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 20 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidiny)l phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 25 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 30 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and

phenylthiourea substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

w is 0-1;

Y is oxygen or sulfur;

R<sup>31</sup> is hydrogen or C<sub>1-6</sub>alkyl;

R<sup>32</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid, thioC<sub>1-6</sub>alkylcarbonyl, thioC<sub>1-6</sub>alkylaminocarbonyl, -C(O)NH-(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>,

-O-R<sup>33</sup>, -NH-R<sup>33</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>, C<sub>1-6</sub>alkyldisulfide,

phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,

C<sub>1-6</sub>alkylthiourea, phenylthiourea, C<sub>1-6</sub>alkylamine, phenylamine,

substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted

phenylurea, substituted C<sub>1-6</sub>alkylamine, substituted phenylamine,

substituted phenylthiourea, substituted C<sub>1-6</sub>alkylurea or substituted

C<sub>1-6</sub>alkylthiourea wherein the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile

where

d is 0-8;

R<sup>33</sup> is thioC<sub>1-6</sub>alkylcarbonyl,

C<sub>1-6</sub>alkyl,

substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from

one or more members of the group consisting of

C<sub>1-6</sub>alkyl, halo C<sub>1-6</sub>alkyl, halogen, hydroxyl,

carboxylic acid, sulfonic acid, phosphonic acid,

amine, amidine, acetamide, nitrile, thiol,

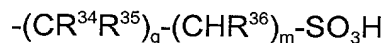
C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide,

urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,

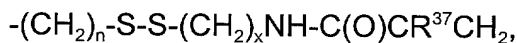
C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted

C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
substituted C<sub>1-6</sub>alkylurea, substituted phenylurea,  
substituted C<sub>1-6</sub>alkylthiourea or substituted  
phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
phenylthiourea substituents are selected from the  
group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl,  
halogen, hydroxyl, carboxylic acid, sulfonic acid,  
phosphonic acid, amine, amidine, acetamide, and  
nitrile;



where R<sup>34</sup>, R<sup>35</sup>, and R<sup>36</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
q is 1-6, and  
m is 0-6;



where R<sup>37</sup> is hydrogen or C<sub>1-6</sub>alkyl,  
n is 1-6, and  
x is 1-6;



where R<sup>38</sup>, R<sup>39</sup>, and R<sup>40</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
t is 1-6, and  
u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

pyrazinyl;  
 benzimidazolyl;  
 benzothiazolyl;  
 benzotriazolyl;  
 naphthaloyl;  
 quinolinyl;  
 indolyl;  
 thiadiazolyl;  
 triazolyl;  
 4-methylpiperidin-1-yl;  
 4-methylpiperazin-1-yl;  
 substituted phenyl;  
 substituted benzyl;  
 substituted pyridinyl;  
 substituted pyrimidinyl;  
 substituted pyrazinyl;  
 substituted benzimidazolyl;  
 substituted benzothiazolyl;  
 substituted benzotriazolyl;  
 substituted naphthaloyl;  
 substituted quinolinyl;  
 substituted indolyl;  
 substituted thiadiazolyl;  
 substituted triazolyl;  
 substituted 4-methylpiperidin-1-yl; or  
 substituted 4-methylpiperazin-1-yl,  
 wherein the substituents are selected from one or more  
 members of the group consisting of C<sub>1-6</sub>alkyl,  
 haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,  
 hydroxyl, carboxylic acid, amine, amidine,  
 N-(2-aminopyrimidine)sulfonyl,

N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,  
 N-(2-aminopyrimidine)carbonyl,  
 N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,  
 N-(2-aminopyrimidine)phosphonyl,  
 5 N-(2-aminopyridine)phosphonyl,  
 N-(aminopyrazine)phosphonyl,  
 N-(aminobenzimidazolyl)sulfonyl,  
 N-(aminobenzothiazolyl)sulfonyl,  
 N-(aminobenzotriazolyl)sulfonyl,  
 10 N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
 N-(aminotriazolyl)sulfonyl,  
 N-(amino-4-methylpiperidinyl)sulfonyl,  
 N-(amino-4-methylpiperazinyl)sulfonyl,  
 N-(aminobenzimidazolyl)carbonyl,  
 15 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidinyl)carbonyl,  
 20 N-(amino-4-methylpiperazinyl)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 25 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidinyl) phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 30 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted



C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
substituted phenylurea, and substituted phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
phenylthiourea substituents are selected from the  
group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
hydroxyl, carboxylic acid, sulfonic acid, phosphonic  
acid, amine, amidine, acetamide, and nitrile;

R<sup>41</sup> is hydrogen, C<sub>1-6</sub>alkyl, phenyl, C<sub>1-6</sub>alkylcarbonyl, phenylcarbonyl,  
substituted C<sub>1-6</sub>alkyl, substituted phenyl, substituted C<sub>1-6</sub>alkylcarbonyl  
or substituted phenylcarbonyl,

wherein

the substituents are selected from the group consisting of  
C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid,  
sulfonic acid, phosphonic acid, amine, amidine, acetamide,  
and nitrile.

2. The antimicrobial lens of claim 1 comprising a polymer comprising a  
monomer of Formula I.

3. The antimicrobial lens of claim 2 wherein,

R<sup>1</sup> is hydrogen or C<sub>1-3</sub>alkyl;

R<sup>2</sup> is NH-R<sup>3</sup>;

d is 0

R<sup>3</sup> is substituted phenyl, -(CR<sup>4</sup> R<sup>5</sup>)<sub>q</sub>-(CHR<sup>6</sup>)<sub>m</sub>-SO<sub>3</sub>H,

-(CR<sup>8</sup>R<sup>9</sup>)<sub>t</sub>-(CHR<sup>10</sup>)<sub>u</sub>-P(O)(OH)<sub>2</sub> or -(CH<sub>2</sub>)<sub>n</sub>-S-S-(CH<sub>2</sub>)<sub>x</sub>NH-C(O)CR<sup>7</sup>CH<sub>2</sub>;

R<sup>4</sup> is hydrogen or C<sub>1-3</sub>alkyl;

R<sup>5</sup> is hydrogen or C<sub>1-3</sub>alkyl;

R<sup>6</sup> is hydrogen or C<sub>1-3</sub>alkyl;

q is 1-3;

m is 1-3;  
R<sup>7</sup> is hydrogen or C<sub>1-3</sub>alkyl;  
R<sup>8</sup> is hydrogen or C<sub>1-3</sub>alkyl;  
R<sup>9</sup> is hydrogen or C<sub>1-3</sub>alkyl;  
5 R<sup>10</sup> is hydrogen or C<sub>1-3</sub>alkyl;  
t is 1-3;  
u is 1-3;  
n is 2-4; and  
x is 2-4.

- 10
4. The antimicrobial lens of claim 2 wherein the lens is a soft contact lens.
  5. The antimicrobial lens of claim 2 wherein the monomer of Formula I is present at about 0.01 to about 1.5 weight percent.
  - 15 6. The antimicrobial lens of claim 2 wherein the monomer of Formula I is present at about 0.01 to about 0.8 weight percent.
  7. The antimicrobial lens of claim 2 wherein the monomer of Formula I is present at about 0.01 to about 0.3 weight percent.
  - 20 8. The antimicrobial lens of claim 2 wherein the monomer of Formula I is present at about 0.01 to about 0.2 weight percent.
  9. The antimicrobial lens of claim 2 wherein the monomer of Formula I is present at about 0.01 to about 0.09 weight percent.
  - 25 10. The antimicrobial lens of claim 2 wherein the lens is a silicone hydrogel.
  11. The antimicrobial lens of claim 2 wherein, the lens is etafilcon A, balafilcon, A, aquafilcon A, lenefilcon A, or lotrafilcon A.
  - 30

12. The antimicrobial lens of claim 2 wherein,

$R^1$  is hydrogen or methyl;

$R^2$  is  $NH-R^3$ ;

$R^3$  is  $-(CR^4 R^5)_q-(CHR^6)_m-SO_3H$ ,  $-(CR^8 R^9)_t-(CHR^{10})_u-P(O)(OH)_2$  or  $-(CH_2)_n-S-S-(CH_2)_x-NH-C(O)CHR^7CH_2$ ;

$R^4$  is hydrogen or methyl;

$R^5$  is hydrogen or methyl;

$q$  is 1-2;

$m$  is 1-2;

$R^6$  is hydrogen or methyl;

$R^7$  is hydrogen;

$R^8$  is hydrogen or methyl;

$R^9$  is hydrogen or methyl;

$R^{10}$  is hydrogen or methyl;

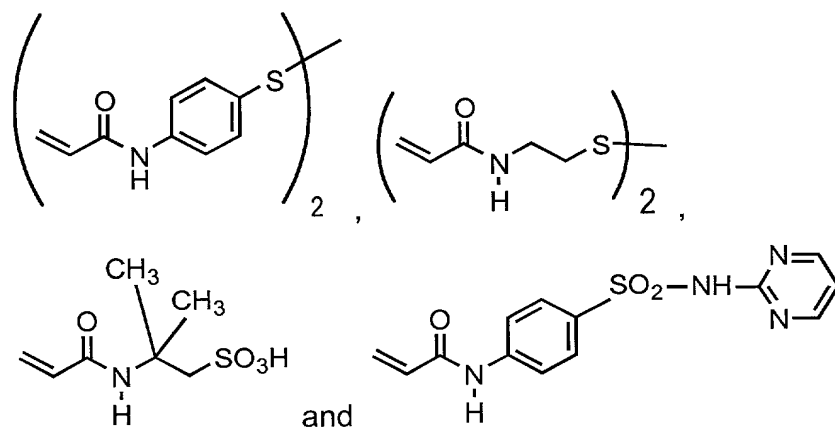
$t$  is 1;

$u$  is 1-2;

$n$  is 2-3; and

$x$  is 2-3.

13. The antimicrobial lens of claim 2 wherein the monomer of Formula I is selected from the group consisting of



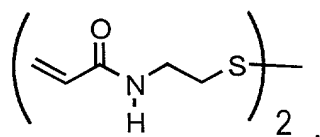
14. The antimicrobial lens of claim 2 wherein silver is present at about 20 ppm to about 1,200 ppm.

15. The antimicrobial lens of claim 2 wherein silver is present at about 20 ppm to about 600 ppm.

16. The antimicrobial lens of claim 2 wherein silver is present at about 20 ppm to about 150 ppm.

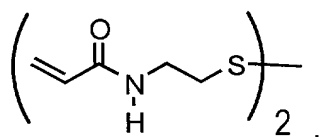
17. The antimicrobial lens of claim 2 wherein silver is present at about 20 ppm to about 75 ppm.

18. The antimicrobial lens of claim 2 wherein the lens is a silicone hydrogel and the monomer of Formula I is



19. The antimicrobial lens of claim 18 wherein silver is present at about 20 ppm to about 150 ppm and the monomer of Formula I is present at about 0.01 to about 1.5 weight percent.

20. The antimicrobial lens of claim 2 wherein the lens is etafilcon A, balafilcon, A, aquafilcon A, lenefilcon, or lotrafilcon A and the monomer of Formula I is



21. The antimicrobial lens of claim 20 wherein silver is present at about 20

ppm to about 150 ppm and the monomer of Formula I is present at about 0.01 to about 1.5 weight percent.

22. The antimicrobial lens of claim 21 wherein the lens is etafilcon A.

23. The antimicrobial lens of claim 21 wherein the lens is aquafilcon A.

24. The lens of claim 23 wherein silver is present at about 20 ppm to about 75 ppm.

25. The antimicrobial lens of claim 1 comprising a polymer comprising a monomer of Formula II.

26. The antimicrobial lens of claim 25 wherein,

a is 1-2,

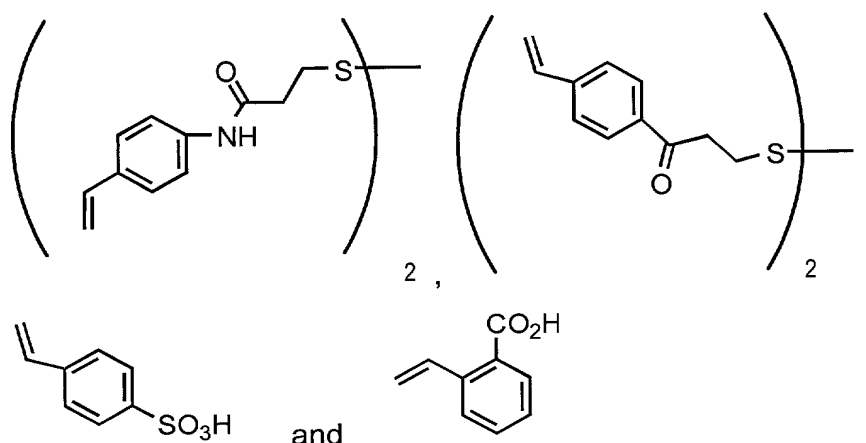
$R^{11}$  is hydrogen or  $C_{1-3}$ alkyl,

$R^{12}$  is sulfonic acid, carboxylic acid, phosphonic acid,

$C_{1-6}$ alkyldisulfide,  $C_{1-6}$ alkylsulfide, phenyldisulfide, substituted phenyldisulfide or  $NH-R^{13}$ ,

$R^{13}$  is thio $C_{1-6}$ alkylcarbonyl.

27. The antimicrobial lens of claim 25 wherein the monomer of Formula II is selected from the group consisting of



28. The antimicrobial lens of claim 25 wherein the lens is a soft contact lens.

5 29. The antimicrobial lens of claim 25 wherein the monomer of Formula II is present at about 0.01 to about 1.5 weight percent.

30. The antimicrobial lens of claim 25 wherein the monomer of Formula II is present at about 0.01 to about 0.8 weight percent.

10 31. The antimicrobial lens of claim 25 wherein the monomer of Formula II is present at about 0.01 to about 0.3 weight percent.

32. The antimicrobial lens of claim 25 wherein the lens is etafilcon A, balafilcon, A, aquafilcon A, lenefilcon A, or lotrafilcon A.

15 33. The antimicrobial lens of claim 25 wherein silver is present at about 20 ppm to about 150 ppm and the monomer of Formula II is present at about 0.01 to about 1.5 weight percent.

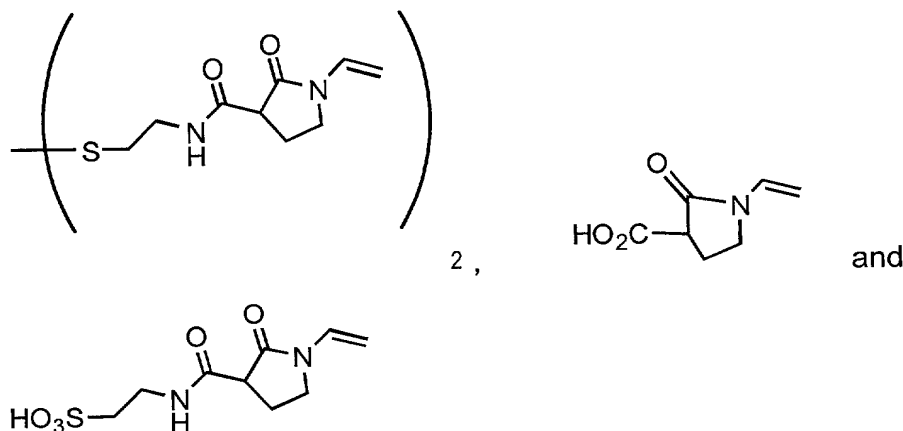
20 34. The antimicrobial lens of claim 33 wherein the lens is etafilcon A or aquafilcon A.

25 35. The antimicrobial lens of claim 1 comprising a polymer comprising a monomer of Formula III.

30 36. The antimicrobial lens of claim 35 wherein,  
p is 1-3;  
b is 1-2;  
R<sup>21</sup> is hydrogen;

R<sup>22</sup> is sulfonic acid, phosphonic acid, carboxylic acid,  
thioC<sub>1-6</sub>alkylcarbonyl, thioC<sub>1-6</sub>alkylaminocarbonyl, C<sub>1-6</sub>alkyldisulfide,  
C<sub>1-6</sub>alkylsulfide, phenyldisulfide, substituted phenyldisulfide,  
H<sub>3</sub>OS-(CH<sub>2</sub>)<sub>1-6</sub>NHC(O) or  
(HO)<sub>2</sub>(O)P-(CH<sub>2</sub>)<sub>1-6</sub>NHC(O)-.

37. The antimicrobial lens of claim 35 wherein the monomer of Formula III is selected from the group consisting of



38. The antimicrobial lens of claim 35 wherein the lens is a soft contact lens.

39. The antimicrobial lens of claim 35 wherein the monomer of Formula III is present at about 0.01 to about 1.5 weight percent.

40. The antimicrobial lens of claim 35 wherein the monomer of Formula III is present at about 0.01 to about 0.8 weight percent.

41. The antimicrobial lens of claim 35 wherein the monomer of Formula III is present at about 0.01 to about 0.3 weight percent.

42. The antimicrobial lens of claim 35 wherein, the lens is etafilcon A, balafilcon, A, acquafilcon A, lenefilcon A, or lotrafilcon A.

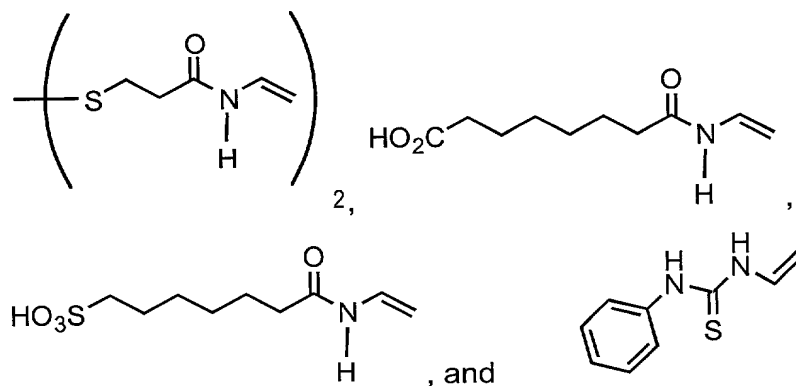
43. The antimicrobial lens of claim 35 wherein silver is present at about 20 ppm to about 150 ppm and the monomer of Formula III is present at about 0.01 to about 1.5 weight percent.

44. The antimicrobial lens of claim 43 wherein the lens is etafilcon A or aquafilcon A.

45. The antimicrobial lens of claim 1 comprising a polymer comprising a monomer of Formula IV.

46. The antimicrobial lens of claim 45 wherein,  
 w is 0-1;  
 $R^{31}$  is hydrogen;  
 $R^{32}$  is amine,  $C_{1-3}$ alkylamine, phenylamine, substituted phenylamine;  
 thio $C_{1-3}$ alkylcarbonyl;  
 $R^{41}$  is hydrogen.

47. The antimicrobial lens of claim 45 wherein the monomer of Formula IV is selected from the group consisting of



48. The antimicrobial lens of claim 45 wherein the lens is a soft contact lens.



49. The antimicrobial lens of claim 45 wherein the monomer of Formula IV is present at about 0.01 to about 1.5 weight percent.

50. The antimicrobial lens of claim 45 wherein the monomer of Formula IV is present at about 0.01 to about 0.8 weight percent.

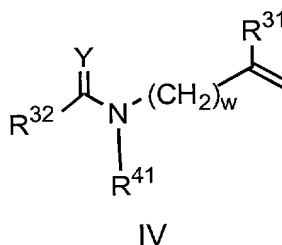
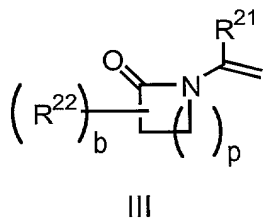
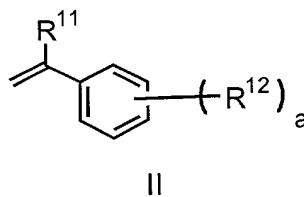
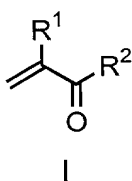
51. The antimicrobial lens of claim 45 wherein the monomer of Formula IV is present at about 0.01 to about 0.3 weight percent.

52. The antimicrobial lens of claim 45 wherein the lens is etafilcon A, balafilcon, A, aquafilcon A, lenefilcon A, or lotrafilcon A.

53. The antimicrobial lens of claim 45 wherein silver is present at about 20 ppm to about 150 ppm and the monomer of Formula IV is present at about 0.01 to about 1.5 weight percent.

54. The antimicrobial lens of claim 53 wherein the lens is etafilcon A or aquafilcon A.

55. A method of producing an antimicrobial lens comprising, silver and a polymer comprising a monomer of Formula I, II, III or IV



wherein

$R^1$  is hydrogen or  $C_{1-6}$ alkyl;

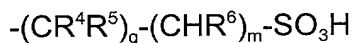
$R^2$  is  $-OR^3$ ,  $-NH-R^3$ ,  $-S-(CH_2)_d-R^3$ , or  $-(CH_2)_d-R^3$ , wherein

$d$  is 0-8;

$R^3$  is substituted  $C_{1-6}$ alkyl

where the alkyl substituents are selected from one or more members of the group consisting of carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol,  $C_{1-6}$ alkyldisulfide,  $C_{1-6}$ alkylsulfide, phenyldisulfide, urea,  $C_{1-6}$ alkylurea, phenylurea, thiourea,  $C_{1-6}$ alkylthiourea, phenylthiourea, substituted  $C_{1-6}$ alkyldisulfide, substituted phenyldisulfide, substituted  $C_{1-6}$ alkylurea, substituted phenylurea, substituted  $C_{1-6}$ alkylthiourea, and substituted phenylthiourea

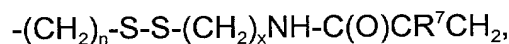
wherein the  $C_{1-6}$ alkyldisulfide, phenyldisulfide,  $C_{1-6}$ alkylurea,  $C_{1-6}$ alkylthiourea, phenylurea, and phenylthiourea substituents are selected from the group consisting of  $C_{1-6}$ alkyl, halo $C_{1-6}$ alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;



wherein  $R^4$ ,  $R^5$ , and  $R^6$  are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and  $C_{1-6}$ alkyl,

$q$  is 1-6, and

$m$  is 0-6;



wherein  $R^7$  is hydrogen or  $C_{1-6}$ alkyl,

$n$  is 1-6, and

$x$  is 1-6;



wherein R<sup>8</sup>, R<sup>9</sup>, and R<sup>10</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl,

t is 1-6, and

u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

pyrazinyl;

benzimidazolyl;

benzothiazolyl;

benzotriazolyl;

naphthaloyl;

quinolinyl;

indolyl;

thiadiazolyl;

triazolyl;

4-methylpiperidin-1-yl;

4-methylpiperazin-1-yl;

substituted phenyl;

substituted benzyl;

substituted pyridinyl;

substituted pyrimidinyl;

substituted pyrazinyl;

substituted benzimidazolyl;

substituted benzothiazolyl;

substituted benzotriazolyl;

substituted naphthaloyl;

substituted quinolinyl;

substituted indolyl;  
substituted thiadiazolyl;  
substituted triazolyl;  
substituted 4-methylpiperidin-1-yl; or  
substituted 4-methylpiperazin-1-yl,

wherein the substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid, hydroxyl, carboxylic acid, amine, amidine, N-(2-aminopyrimidine)sulfonyl, N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl, N-(2-aminopyrimidine)carbonyl, N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl, N-(2-aminopyrimidine)phosphonyl, N-(2-aminopyridine)phosphonyl, N-(aminopyrazine)phosphonyl, N-(aminobenzimidazolyl)sulfonyl, N-(aminobenzothiazolyl)sulfonyl, N-(aminobenzotriazolyl)sulfonyl, N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl, N-(aminotriazolyl)sulfonyl, N-(amino-4-methylpiperidinyl)sulfonyl, N-(amino-4-methylpiperazinyl)sulfonyl, N-(aminobenzimidazolyl)carbonyl, N-(aminobenzothiazolyl)carbonyl, N-(aminobenzotriazolyl)carbonyl, N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl, N-(aminotriazolyl)carbonyl, N-(amino-4-methylpiperidinyl)carbonyl, N-(amino-4-methylpiperazinyl)carbonyl, N-(2-aminobenzimidazolyl)phosphonyl,

N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidinyl) phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
 hydroxyl, carboxylic acid, sulfonic acid, phosphonic  
 acid, amine, amidine, acetamide, and nitrile;

a is 1-5;

R<sup>11</sup> is hydrogen or C<sub>1-6</sub>alkyl;

R<sup>12</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid,  
 acetamide, thioC<sub>1-6</sub>alkylcarbonyl, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide,  
 phenyl disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,

C<sub>1-6</sub>alkylthiourea, phenylthiourea, -OR<sup>13</sup>, -NH-R<sup>13</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>,  
 -(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -C(O)NH--(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -C(O)-(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea,  
 substituted phenylurea, substituted phenylthiourea or substituted  
 C<sub>1-6</sub>alkylthiourea wherein the substituents are selected from the group  
 consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid,  
 sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

where

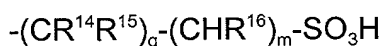
d is 0-8;

R<sup>13</sup> is thioC<sub>1-6</sub>alkylcarbonyl;

substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from one or more members of the group consisting of hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted C<sub>1-6</sub>alkylthiourea and substituted phenylthiourea

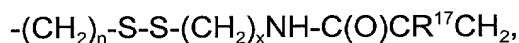
wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and phenylthiourea substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;



where R<sup>14</sup>, R<sup>15</sup>, and R<sup>16</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl,

q is 1-6, and

m is 0-6;



where R<sup>17</sup> is hydrogen or C<sub>1-6</sub>alkyl,

n is 1-6, and

x is 1-6;



where R<sup>18</sup>, R<sup>19</sup>, and R<sup>20</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,

t is 1-6, and

u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

pyrazinyl;

benzimidazolyl;

benzothiazolyl;

benzotriazolyl;

naphthaloyl;

quinolinyl;

indolyl;

thiadiazolyl;

triazolyl;

4-methylpiperidin-1-yl;

4-methylpiperazin-1-yl;

substituted phenyl;

substituted benzyl;

substituted pyridinyl;

substituted pyrimidinyl;

substituted pyrazinyl;

substituted benzimidazolyl;

substituted benzothiazolyl;

substituted benzotriazolyl;

substituted naphthaloyl;

substituted quinolinyl;

substituted indolyl;

substituted thiadiazolyl;  
substituted triazolyl;  
substituted 4-methylpiperidin-1-yl; or  
substituted 4-methylpiperazin-1-yl

5                wherein the substituents are selected from one or more  
members of the group consisting of C<sub>1-6</sub>alkyl,  
haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,  
hydroxyl, carboxylic acid, amine, amidine,  
N-(2-aminopyrimidine)sulfonyl,  
10            N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,  
N-(2-aminopyrimidine)carbonyl,  
N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,  
N-(2-aminopyrimidine)phosphonyl,  
N-(2-aminopyridine)phosphonyl,  
15            N-(aminopyrazine)phosphonyl,  
N-(aminobenzimidazolyl)sulfonyl,  
N-(aminobenzothiazolyl)sulfonyl,  
N-(aminobenzotriazolyl)sulfonyl,  
N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
20            N-(aminotriazolyl)sulfonyl,  
N-(amino-4-methylpiperidinyl)sulfonyl,  
N-(amino-4-methylpiperazinyl)sulfonyl,  
N-(aminobenzimidazolyl)carbonyl,  
N-(aminobenzothiazolyl)carbonyl,  
25            N-(aminobenzotriazolyl)carbonyl,  
N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
N-(aminotriazolyl)carbonyl,  
N-(amino-4-methylpiperidinyl)carbonyl,  
N-(amino-4-methylpiperazinyl)carbonyl,  
30            N-(2-aminobenzimidazolyl)phosphonyl,  
N-(2-aminobenzothiazolyl)phosphonyl,



N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidiny) phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
 hydroxyl, carboxylic acid, sulfonic acid, phosphonic  
 acid, amine, amidine, acetamide, and nitrile;

b is 1-5;

p is 1-5;

R<sup>21</sup> is hydrogen;

R<sup>22</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid,  
 thioC<sub>1-6</sub>alkylcarbonyl, thioC<sub>1-6</sub>alkylaminocarbonyl, C<sub>1-6</sub>alkyldisulfide,  
 phenyldisulfide, -C(O)NH(CH<sub>2</sub>)<sub>1-6</sub>-SO<sub>3</sub>H, -C(O)NH(CH<sub>2</sub>)<sub>1-6</sub>-P(O)(OH)<sub>2</sub>,  
 -OR<sup>23</sup>, -NH-R<sup>23</sup>, -C(O)NH-(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, urea,  
 C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea,  
 substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted  
 C<sub>1-6</sub>alkylurea, substituted, C<sub>1-6</sub>alkylthiourea substituted phenylurea or  
 substituted phenylthiourea wherein the substituents are selected from  
 the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl,

carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile,

where

d is 0-8;

R<sup>23</sup> is thioC<sub>1-6</sub>alkylcarbonyl,

C<sub>1-6</sub>alkyl,

substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl, halo C<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted C<sub>1-6</sub>alkylthiourea, and substituted phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and phenylthiourea substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

-(CR<sup>24</sup> R<sup>25</sup>)<sub>q</sub>-(CHR<sup>26</sup>)<sub>m</sub>-SO<sub>3</sub>H

where R<sup>24</sup>, R<sup>25</sup>, and R<sup>26</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl,

q is 1-6, and

m is 0-6

-(CH<sub>2</sub>)<sub>n</sub>-S-S-(CH<sub>2</sub>)<sub>x</sub>NH-C(O)CR<sup>27</sup>CH<sub>2</sub>,

where R<sup>27</sup> is hydrogen or C<sub>1-6</sub>alkyl,

n is 1-6, and

x is 1-6;



where R<sup>28</sup>, R<sup>29</sup>, and R<sup>30</sup> are independently selected

from the group consisting of hydrogen, halogen,

hydroxyl, and C<sub>1-6</sub>alkyl,

t is 1-6, and

u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

pyrazinyl;

benzimidazolyl;

benzothiazolyl;

benzotriazolyl;

naphthaloyl;

quinolinyl;

indolyl;

thiadiazolyl;

triazolyl;

4-methylpiperidin-1-yl;

4-methylpiperazin-1-yl;

substituted phenyl;

substituted benzyl;

substituted pyridinyl;

substituted pyrimidinyl;

substituted pyrazinyl;

substituted benzimidazolyl;

substituted benzothiazolyl;

substituted benzotriazolyl;

substituted naphthaloyl;

substituted quinolinyl;

substituted indolyl;

substituted thiadiazolyl;

substituted triazolyl;

substituted 4-methylpiperidin-1-yl; or

substituted 4-methylpiperazin-1-yl,

wherein the substituents are selected from one or more

members of the group consisting of C<sub>1-6</sub>alkyl,

haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,

hydroxyl, carboxylic acid, amine, amidine,

N-(2-aminopyrimidine)sulfonyl,

N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,

N-(2-aminopyrimidine)carbonyl,

N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,

N-(2-aminopyrimidine)phosphonyl,

N-(2-aminopyridine)phosphonyl,

N-(aminopyrazine)phosphonyl,

N-(aminobenzimidazolyl)sulfonyl,

N-(aminobenzothiazolyl)sulfonyl,

N-(aminobenzotriazolyl)sulfonyl,

N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,

N-(aminotriazolyl)sulfonyl,

N-(amino-4-methylpiperidinyl)sulfonyl,

N-(amino-4-methylpiperazinyl)sulfonyl,

N-(aminobenzimidazolyl)carbonyl,

N-(aminobenzothiazolyl)carbonyl,

N-(aminobenzotriazolyl)carbonyl,

N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,

N-(aminotriazolyl)carbonyl,

N-(amino-4-methylpiperidiny)carbonyl,  
 N-(amino-4-methylpiperaziny)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidiny) phosphonyl,  
 N-(amino-4-methylpiperaziny) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
 hydroxyl, carboxylic acid, sulfonic acid, phosphonic  
 acid, amine, amidine, acetamide, and nitrile;

w is 0-1;

Y is oxygen or sulfur;

R<sup>31</sup> is hydrogen or C<sub>1-6</sub>alkyl;

R<sup>32</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid,  
 thioC<sub>1-6</sub>alkylcarbonyl, thioC<sub>1-6</sub>alkylaminocarbonyl, -C(O)NH-(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>,  
 -O-R<sup>33</sup>, -NH-R<sup>33</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>, C<sub>1-6</sub>alkyldisulfide,  
 phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, C<sub>1-6</sub>alkylamine, phenylamine,  
 substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted

phenylurea, substituted C<sub>1-6</sub>alkylamine, substituted phenylamine, substituted phenylthiourea, substituted C<sub>1-6</sub>alkylurea or substituted C<sub>1-6</sub>alkylthiourea wherein the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile

where

d is 0-8;

R<sup>33</sup> is thioC<sub>1-6</sub>alkylcarbonyl,

C<sub>1-6</sub>alkyl,

substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from one or more members of the group consisting of

C<sub>1-6</sub>alkyl, halo C<sub>1-6</sub>alkyl, halogen, hydroxyl,

carboxylic acid, sulfonic acid, phosphonic acid,

amine, amidine, acetamide, nitrile, thiol,

C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide,

urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,

C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted

C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,

substituted C<sub>1-6</sub>alkylurea, substituted phenylurea,

substituted C<sub>1-6</sub>alkylthiourea or substituted

phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,

C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and

phenylthiourea substituents are selected from the

group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl,

halogen, hydroxyl, carboxylic acid, sulfonic acid,

phosphonic acid, amine, amidine, acetamide, and

nitrile;

-(CR<sup>34</sup>R<sup>35</sup>)<sub>q</sub>-(CHR<sup>36</sup>)<sub>m</sub>-SO<sub>3</sub>H

where R<sup>34</sup>, R<sup>35</sup>, and R<sup>36</sup> are independently selected

from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
q is 1-6, and  
m is 0-6;

5  $-(CH_2)_n-S-S-(CH_2)_x-NH-C(O)CR^{37}CH_2$ ,  
where R<sup>37</sup> is hydrogen or C<sub>1-6</sub>alkyl,  
n is 1-6, and  
x is 1-6;

10  $-(CR^{38}R^{39})_t-(CHR^{40})_u-P(O)(OH)_2$   
where R<sup>38</sup>, R<sup>39</sup>, and R<sup>40</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
t is 1-6, and  
u is 0-6;

15 phenyl;  
benzyl;  
pyridinyl;  
pyrimidinyl;  
pyrazinyl;  
20 benzimidazolyl;  
benzothiazolyl;  
benzotriazolyl;  
naphthaloyl;  
quinolinyl;  
25 indolyl;  
thiadiazolyl;  
triazolyl;  
4-methylpiperidin-1-yl;  
4-methylpiperazin-1-yl;  
30 substituted phenyl;  
substituted benzyl;

substituted pyridinyl;  
substituted pyrimidinyl;  
substituted pyrazinyl;  
substituted benzimidazolyl;  
substituted benzothiazolyl;  
substituted benzotriazolyl;  
substituted naphthaloyl;  
substituted quinolinyl;  
substituted indolyl;  
substituted thiadiazolyl;  
substituted triazolyl;  
substituted 4-methylpiperidin-1-yl; or  
substituted 4-methylpiperazin-1-yl,

wherein the substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid, hydroxyl, carboxylic acid, amine, amidine, N-(2-aminopyrimidine)sulfonyl, N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl, N-(2-aminopyrimidine)carbonyl, N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl, N-(2-aminopyrimidine)phosphonyl, N-(2-aminopyridine)phosphonyl, N-(aminopyrazine)phosphonyl, N-(aminobenzimidazolyl)sulfonyl, N-(aminobenzothiazolyl)sulfonyl, N-(aminobenzotriazolyl)sulfonyl, N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl, N-(aminotriazolyl)sulfonyl, N-(amino-4-methylpiperidinyl)sulfonyl, N-(amino-4-methylpiperazinyl)sulfonyl,



N-(aminobenzimidazolyl)carbonyl,  
 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidiny)carbonyl,  
 N-(amino-4-methylpiperaziny)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidiny) phosphonyl,  
 N-(amino-4-methylpiperaziny) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
 hydroxyl, carboxylic acid, sulfonic acid, phosphonic  
 acid, amine, amidine, acetamide, and nitrile;

R<sup>41</sup> is hydrogen, C<sub>1-6</sub>alkyl, phenyl, C<sub>1-6</sub>alkylcarbonyl, phenylcarbonyl,  
 substituted C<sub>1-6</sub>alkyl, substituted phenyl, substituted C<sub>1-6</sub>alkylcarbonyl  
 or substituted phenylcarbonyl,

wherein

the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile.

5

where the method comprises the steps of

- (a) preparing a lens comprising a monomer of Formula I, II, III or IV and
- (b) treating said lens with a silver solution.

10

56. The method of claim 55 wherein the silver solution is aqueous silver nitrate having a concentration of about 0.1 µg/mL to about .3 g/mL.

57. The method of claim 55 wherein, treating comprises soaking the lens comprising a polymer of a monomer of Formula I, II, III or IV with a silver solution.

15

58. The method of claim 55 wherein, the lens comprising a polymer of a monomer of Formula I, II, III or IV is soaking for about 2 minutes to about 2 hours.

20

59. The method of claim 55 wherein, treating comprises storing the lens comprising a polymer of a monomer of Formula I, II, III or IV with a silver solution for about 20 minutes to about 5 years.

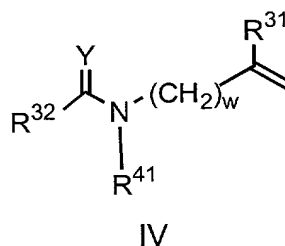
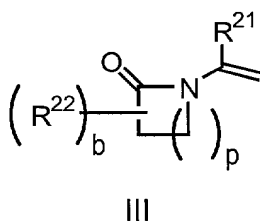
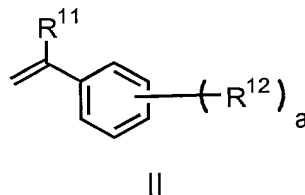
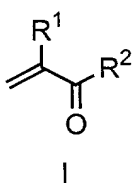
25

60. An antimicrobial lens comprising silver and a polymer comprising a binding monomer wherein said antimicrobial lens can reversibly bind silver.

30

61. The antimicrobial lens of claim 60 wherein the binding monomer has a stability constant of about 2 to about 7.3.

62. A lens case comprising silver and a polymer comprising a monomer of Formula I, II, III or IV



wherein

R<sup>1</sup> is hydrogen or C<sub>1-6</sub>alkyl;

R<sup>2</sup> is -OR<sup>3</sup>, -NH-R<sup>3</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>3</sup>, or -(CH<sub>2</sub>)<sub>d</sub>-R<sup>3</sup>, wherein

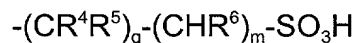
d is 0-8;

R<sup>3</sup> is substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from one or more members of the group consisting of carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted C<sub>1-6</sub>alkylthiourea, and substituted phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and

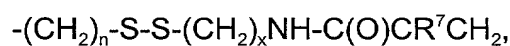
phenylthiourea substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;



wherein R<sup>4</sup>, R<sup>5</sup>, and R<sup>6</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl,

q is 1-6, and

10 m is 0-6;



wherein R<sup>7</sup> is hydrogen or C<sub>1-6</sub>alkyl,

n is 1-6, and

x is 1-6;



wherein R<sup>8</sup>, R<sup>9</sup>, and R<sup>10</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl,

t is 1-6, and

20 u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

25 pyrazinyl;

benzimidazolyl;

benzothiazolyl;

benzotriazolyl;

naphthaloyl;

30 quinolinyl;

indolyl;

thiadiazolyl;  
 triazolyl;  
 4-methylpiperidin-1-yl;  
 4-methylpiperazin-1-yl;  
 5 substituted phenyl;  
 substituted benzyl;  
 substituted pyridinyl;  
 substituted pyrimidinyl;  
 substituted pyrazinyl;  
 10 substituted benzimidazolyl;  
 substituted benzothiazolyl;  
 substituted benzotriazolyl;  
 substituted naphthaloyl;  
 substituted quinolinyl;  
 15 substituted indolyl;  
 substituted thiadiazolyl;  
 substituted triazolyl;  
 substituted 4-methylpiperidin-1-yl; or  
 substituted 4-methylpiperazin-1-yl,  
 20 wherein the substituents are selected from one or more  
 members of the group consisting of C<sub>1-6</sub>alkyl,  
 haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,  
 hydroxyl, carboxylic acid, amine, amidine,  
 N-(2-aminopyrimidine)sulfonyl,  
 25 N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,  
 N-(2-aminopyrimidine)carbonyl,  
 N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,  
 N-(2-aminopyrimidine)phosphonyl,  
 N-(2-aminopyridine)phosphonyl,  
 30 N-(aminopyrazine)phosphonyl,  
 N-(aminobenzimidazolyl)sulfonyl,

N-(aminobenzothiazolyl)sulfonyl,  
 N-(aminobenzotriazolyl)sulfonyl,  
 N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
 N-(aminotriazolyl)sulfonyl,  
 N-(amino-4-methylpiperidinyl)sulfonyl,  
 N-(amino-4-methylpiperazinyl)sulfonyl,  
 N-(aminobenzimidazolyl)carbonyl,  
 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidinyl)carbonyl,  
 N-(amino-4-methylpiperazinyl)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidinyl) phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,

hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

a is 1-5;

R<sup>11</sup> is hydrogen or C<sub>1-6</sub>alkyl;

R<sup>12</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid, acetamide, thioC<sub>1-6</sub>alkylcarbonyl, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, -OR<sup>13</sup>, -NH-R<sup>13</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -C(O)NH--(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, -C(O)-(CH<sub>2</sub>)<sub>d</sub>-R<sup>13</sup>, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted phenylthiourea or substituted C<sub>1-6</sub>alkylthiourea wherein the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

where

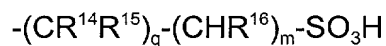
d is 0-8;

R<sup>13</sup> is thioC<sub>1-6</sub>alkylcarbonyl;  
substituted C<sub>1-6</sub>alkyl

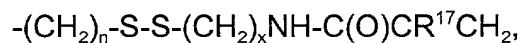
where the alkyl substituents are selected from one or more members of the group consisting of hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted C<sub>1-6</sub>alkylthiourea and substituted phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and phenylthiourea substituents are selected from the

group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;



where R<sup>14</sup>, R<sup>15</sup>, and R<sup>16</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl, q is 1-6, and m is 0-6;



where R<sup>17</sup> is hydrogen or C<sub>1-6</sub>alkyl, n is 1-6, and x is 1-6;



where R<sup>18</sup>, R<sup>19</sup>, and R<sup>20</sup> are independently selected from the group consisting of hydrogen, halogen, hydroxyl, and C<sub>1-6</sub>alkyl, t is 1-6, and u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;

pyrazinyl;

benzimidazolyl;

benzothiazolyl;

benzotriazolyl;

naphthaloyl;

quinolinyl;

indolyl;

thiadiazolyl;



triazolyl;  
4-methylpiperidin-1-yl;  
4-methylpiperazin-1-yl;  
substituted phenyl;  
substituted benzyl;  
substituted pyridinyl;  
substituted pyrimidinyl;  
substituted pyrazinyl;  
substituted benzimidazolyl;  
substituted benzothiazolyl;  
substituted benzotriazolyl;  
substituted naphthaloyl;  
substituted quinolinyl;  
substituted indolyl;  
substituted thiadiazolyl;  
substituted triazolyl;  
substituted 4-methylpiperidin-1-yl; or  
substituted 4-methylpiperazin-1-yl

wherein the substituents are selected from one or more  
members of the group consisting of C<sub>1-6</sub>alkyl,  
haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,  
hydroxyl, carboxylic acid, amine, amidine,  
N-(2-aminopyrimidine)sulfonyl,  
N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,  
N-(2-aminopyrimidine)carbonyl,  
N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,  
N-(2-aminopyrimidine)phosphonyl,  
N-(2-aminopyridine)phosphonyl,  
N-(aminopyrazine)phosphonyl,  
N-(aminobenzimidazolyl)sulfonyl,  
N-(aminobenzothiazolyl)sulfonyl,

5

10

15

20

25

30

N-(aminobenzotriazolyl)sulfonyl,  
 N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
 N-(aminotriazolyl)sulfonyl,  
 N-(amino-4-methylpiperidinyl)sulfonyl,  
 N-(amino-4-methylpiperazinyl)sulfonyl,  
 N-(aminobenzimidazolyl)carbonyl,  
 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidinyl)carbonyl,  
 N-(amino-4-methylpiperazinyl)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidinyl) phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
 phenylthiourea substituents are selected from the  
 group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
 hydroxyl, carboxylic acid, sulfonic acid, phosphonic

acid, amine, amidine, acetamide, and nitrile;

b is 1-5;

p is 1-5;

R<sup>21</sup> is hydrogen;

R<sup>22</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid, thioC<sub>1-6</sub>alkylcarbonyl, thioC<sub>1-6</sub>alkylaminocarbonyl, C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, -C(O)NH(CH<sub>2</sub>)<sub>1-6</sub>-SO<sub>3</sub>H, -C(O)NH(CH<sub>2</sub>)<sub>1-6</sub>-P(O)(OH)<sub>2</sub>, -OR<sup>23</sup>, -NH-R<sup>23</sup>, -C(O)NH-(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>23</sup>, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted, C<sub>1-6</sub>alkylthiourea substituted phenylurea or substituted phenylthiourea wherein the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile,

where

d is 0-8;

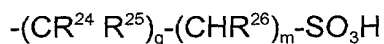
R<sup>23</sup> is thioC<sub>1-6</sub>alkylcarbonyl,

C<sub>1-6</sub>alkyl,

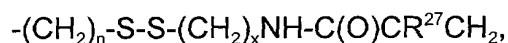
substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl, halo C<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted C<sub>1-6</sub>alkylurea, substituted phenylurea, substituted C<sub>1-6</sub>alkylthiourea, and substituted phenylthiourea

wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
phenylthiourea substituents are selected from the  
group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen,  
hydroxyl, carboxylic acid, sulfonic acid, phosphonic  
acid, amine, amidine, acetamide, and nitrile;



where R<sup>24</sup>, R<sup>25</sup>, and R<sup>26</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
q is 1-6, and  
m is 0-6



where R<sup>27</sup> is hydrogen or C<sub>1-6</sub>alkyl,  
n is 1-6, and  
x is 1-6;



where R<sup>28</sup>, R<sup>29</sup>, and R<sup>30</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,  
t is 1-6, and  
u is 0-6;

phenyl;  
benzyl;  
pyridinyl;  
pyrimidinyl;  
pyrazinyl;  
benzimidazolyl;  
benzothiazolyl;  
benzotriazolyl;  
naphthaloyl;

quinolinyl;  
 indolyl;  
 thiadiazolyl;  
 triazolyl;  
 4-methylpiperidin-1-yl;  
 4-methylpiperazin-1-yl;  
 substituted phenyl;  
 substituted benzyl;  
 substituted pyridinyl;  
 substituted pyrimidinyl;  
 substituted pyrazinyl;  
 substituted benzimidazolyl;  
 substituted benzothiazolyl;  
 substituted benzotriazolyl;  
 substituted naphthaloyl;  
 substituted quinolinyl;  
 substituted indolyl;  
 substituted thiadiazolyl;  
 substituted triazolyl;  
 substituted 4-methylpiperidin-1-yl; or  
 substituted 4-methylpiperazin-1-yl,

wherein the substituents are selected from one or more  
 members of the group consisting of C<sub>1-6</sub>alkyl,  
 haloC<sub>1-6</sub>alkyl, halogen, sulfonic acid, phosphonic acid,  
 hydroxyl, carboxylic acid, amine, amidine,  
 N-(2-aminopyrimidine)sulfonyl,  
 N-(aminopyridine)sulfonyl, N-(aminopyrazine)sulfonyl,  
 N-(2-aminopyrimidine)carbonyl,  
 N-(aminopyridine)carbonyl, N-(aminopyrazine)carbonyl,  
 N-(2-aminopyrimidine)phosphonyl,  
 N-(2-aminopyridine)phosphonyl,

N-(aminopyrazine)phosphonyl,  
 N-(aminobenzimidazolyl)sulfonyl,  
 N-(aminobenzothiazolyl)sulfonyl,  
 N-(aminobenzotriazolyl)sulfonyl,  
 N-(aminoindolyl)sulfonyl, N-(aminothiazolyl)sulfonyl,  
 N-(aminotriazolyl)sulfonyl,  
 N-(amino-4-methylpiperidinyl)sulfonyl,  
 N-(amino-4-methylpiperazinyl)sulfonyl,  
 N-(aminobenzimidazolyl)carbonyl,  
 N-(aminobenzothiazolyl)carbonyl,  
 N-(aminobenzotriazolyl)carbonyl,  
 N-(aminoindolyl)carbonyl, N-(aminothiazolyl)carbonyl,  
 N-(aminotriazolyl)carbonyl,  
 N-(amino-4-methylpiperidinyl)carbonyl,  
 N-(amino-4-methylpiperazinyl)carbonyl,  
 N-(2-aminobenzimidazolyl)phosphonyl,  
 N-(2-aminobenzothiazolyl)phosphonyl,  
 N-(2-aminobenzotriazolyl)phosphonyl,  
 N-(2-aminoindolyl)phosphonyl,  
 N-(2-aminothiazolyl)phosphonyl,  
 N-(2-aminotriazolyl)phosphonyl,  
 N-(amino-4-methylpiperidinyl) phosphonyl,  
 N-(amino-4-methylpiperazinyl) phosphonyl, acetamide,  
 nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyl  
 disulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea,  
 C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted  
 C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
 substituted C<sub>1-6</sub>alkylurea, substituted C<sub>1-6</sub>alkylthiourea,  
 substituted phenylurea, and substituted phenylthiourea  
 wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
 C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and

phenylthiourea substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile;

w is 0-1;

Y is oxygen or sulfur;

R<sup>31</sup> is hydrogen or C<sub>1-6</sub>alkyl;

R<sup>32</sup> is hydroxyl, sulfonic acid, phosphonic acid, carboxylic acid, thioC<sub>1-6</sub>alkylcarbonyl, thioC<sub>1-6</sub>alkylaminocarbonyl, -C(O)NH-(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>, -O-R<sup>33</sup>, -NH-R<sup>33</sup>, -S-(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>, -(CH<sub>2</sub>)<sub>d</sub>-R<sup>33</sup>, C<sub>1-6</sub>alkyldisulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, C<sub>1-6</sub>alkylamine, phenylamine, substituted C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide, substituted phenylurea, substituted C<sub>1-6</sub>alkylamine, substituted phenylamine, substituted phenylthiourea, substituted C<sub>1-6</sub>alkylurea or substituted C<sub>1-6</sub>alkylthiourea wherein the substituents are selected from the group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, and nitrile

where

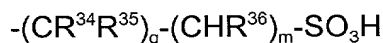
d is 0-8;

R<sup>33</sup> is thioC<sub>1-6</sub>alkylcarbonyl, C<sub>1-6</sub>alkyl, substituted C<sub>1-6</sub>alkyl

where the alkyl substituents are selected from one or more members of the group consisting of C<sub>1-6</sub>alkyl, halo C<sub>1-6</sub>alkyl, halogen, hydroxyl, carboxylic acid, sulfonic acid, phosphonic acid, amine, amidine, acetamide, nitrile, thiol, C<sub>1-6</sub>alkyldisulfide, C<sub>1-6</sub>alkylsulfide, phenyldisulfide, urea, C<sub>1-6</sub>alkylurea, phenylurea, thiourea, C<sub>1-6</sub>alkylthiourea, phenylthiourea, substituted

C<sub>1-6</sub>alkyldisulfide, substituted phenyldisulfide,  
substituted C<sub>1-6</sub>alkylurea, substituted phenylurea,  
substituted C<sub>1-6</sub>alkylthiourea or substituted  
phenylthiourea

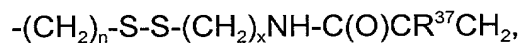
wherein the C<sub>1-6</sub>alkyldisulfide, phenyldisulfide,  
C<sub>1-6</sub>alkylurea, C<sub>1-6</sub>alkylthiourea, phenylurea, and  
phenylthiourea substituents are selected from the  
group consisting of C<sub>1-6</sub>alkyl, haloC<sub>1-6</sub>alkyl,  
halogen, hydroxyl, carboxylic acid, sulfonic acid,  
phosphonic acid, amine, amidine, acetamide, and  
nitrile;



where R<sup>34</sup>, R<sup>35</sup>, and R<sup>36</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,

q is 1-6, and

m is 0-6;



where R<sup>37</sup> is hydrogen or C<sub>1-6</sub>alkyl,

n is 1-6, and

x is 1-6;



where R<sup>38</sup>, R<sup>39</sup>, and R<sup>40</sup> are independently selected  
from the group consisting of hydrogen, halogen,  
hydroxyl, and C<sub>1-6</sub>alkyl,

t is 1-6, and

u is 0-6;

phenyl;

benzyl;

pyridinyl;

pyrimidinyl;